The Non-Allergic Wheeze

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SUMMARY

Nearly every major disease of the lungs may be at one time associated with non-allergic wheezing and simulate asthma. The physiological production of wheezing is associated with air flowing through narrowed bronchi, and experimentally it can be induced when a high negative pressure is made in a tuberculous cavity. Wheezing is important as an early diagnostic symptom of polypoid bronchial tumors, both malignant and benign. By constantly keeping in mind the lesions which mechanically produce bronchial conditions which may cause non-allergic wheeze, appropriate diagnostic and therapeutic measures may be instituted early in the course of these diseases.

WHEEZING is so commonly associated with pulmonary allergic disease that this respiratory noise has come to be looked upon as almost pathognomonic of asthma. So close is this association in the minds of both the laity and medical profession that it has led to frequent mistaken diagnoses of several types of thoracic lesions as bronchial asthma. It is the purpose of this presentation to describe lesions observed by the author in lung, mediastinum, and tracheobronchial tree that made their presence known to the patient by a wheeze. The wheeze in these cases was not related to bronchial spasm and its cause was not allergic.

Before the common use of x-ray of the chest and bronchoscopy, a wheezing in the chest was often considered to be asthmatic, and testing for allergic reaction and treatment according to immunologic desensitization methods were instituted without these examinations being performed. Today, in well regulated practice, a wheezing patient receives an x-ray of the chest and fluoroscopic examination. In any case in which the wheeze is postural, unilateral, inspiratory, and of uncertain origin, bronchoscopic examination should be considered.

Perhaps the most logical background for suspecting that a wheeze is non-allergic is to understand the cause of such respiratory noises and to think of other diseases which mechanically produce conditions that may cause wheezing. Among such pathological conditions, pulmonary tuberculosis in its three main forms, cavitary, lymphoglandular and tracheobronchial, produces such a wheeze.

In cavitary tuberculosis, as a caseous area in the parenchyma is coughed up, air leaks into this parenchymal area through diseased tortuous bronchi of the segmental or subsegmental order. Mechanical narrowings are caused by tufts of granulation tissue jutting into these small bronchi, by edema and submucosal cellular infiltrations, and finally by scar tissue. This results in kinks and intrinsic stenoses, not only intraluminal, but also at the cavity-bronchus junction. Air flowing over these tubal narrowings produces the wheeze.

Experimentally it was possible to produce a wheeze audible without the aid of a stethoscope after establishing a high negative pressure within such a tuberculous cavity. This wheeze was present throughout both the inspiratory and expiratory phases of at least one full respiratory cycle.

It is also likely that bronchi in the area surrounding the cavity give rise to numerous, short, high-pitched wheezes due to the thick grumous material lying within these bronchial lumina, which are apt to be of a segmental order. Such wheezes are usually altered by postural changes and by cough. They simulate closely the musical sounds heard in the chests of asthmatic patients, but differ in that the area over which the wheezes are loudest is usually lobar and unilateral. Concomitant bronchospasm of undiseased areas may be present. Tuberculosis of lymph nodes produces wheezing through effecting bronchial narrowing by external pressure. Children especially are subject to this type of bronchial stenosis, since the primary complex is associated with enlargement of mediastinal lymph nodes and these lymph nodes lie on the trachea and bronchial walls. Calcified lymph nodes may set up wheezing in the trachea and in large and small bronchi. When the cardinal symptom of calcified lymph nodes is not hemorrhage, wheezing usually is the presenting complaint.

Tracheobronchial tuberculosis may be present in a patient even though x-ray films show no definite signs of disease. Often the wheeze set up by subacute hypertrophic bronchial ulceration is the patient's first complaint and productive cough sets in later when cavitation is likely to make its appearance. Disease of the lower lobes is prone to produce this picture and positive sputum is difficult to obtain before large cavities are formed. Bronchoscopic examination usually yields information leading to the correct diagnosis, since bronchial smears made directly from the ulcerations are positive for acid-fast bacilli. Treatment with streptomycin often re-

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stores the bronchoscopic appearance to normal and the wheeze disappears. The following cases illustrate these features.

CASE REPORTS

CASE 1: A white female, aged 32, entered the Cedars of Lebanon Hospital, August 8, 1947, complaining of weight loss and wheezing of six months' duration following recent release from a European displaced persons camp. There was a pronounced wheeze in the left chest which was heard on both inspiration and expiration. Auscultation disclosed the wheeze was transmitted to the right chest. Sputum was negative for acid-fast bacilli.

After the patient had been examined to determine if the cause were allergic, bronchoscopic examination disclosed subacute ulceration about the mouth of the superior segmental bronchus of the left lower lobe. Smears from this area were positive for acid-fast bacilli. The patient was transferred to the Los Angeles Sanatorium, September 5, 1947. New x-ray films of the chest disclosed a cavity in the lower left lobe. After use of streptomycin, pneumoperitoneum and left phrenic nerve crushing, the wheezing cough ceased and the cavity closed. Sputum and gastric examinations have been negative on smear and culture for 12 months and the disease is considered arrested.

CASE 2: A white female, aged 25, entered the Los Angeles Sanatorium, April 19, 1938, with pulmonary tuberculosis of the left lung and hydropneumothorax. At the time of onset of symptoms in 1920, there had been pronounced wheezing as well as cough. Examined for allergic reaction in 1921 because of hay fever, she was found sensitive to a number of inhalants. Spontaneous left pneumothorax occurred in 1931 and resulted in increased wheezing. The wheezing diminished in a few days and the lung then was atelectatic. Tuberculous mixed infection, pleural empyema with bronchopleural fistula, occurred. This was treated by thoracoplasty and drainage. Wheezing persisted intermittently.

Bronchoscopic examinations were begun in February, 1932, and were repeated every few months for 14 years. These examinations always disclosed a narrowing of the left stem bronchus to one-eighth inch in diameter at its bifurcation, with varying degrees of subacute hypertrophic ulceration. Wheezing and cough continued intermittently until November 4, 1946, when the patient was transferred to Cedars of Lebanon Hospital and a left pneumonectomy with resection of the bronchocutaneous fistula was performed. An unexpected finding was a broncholith (Figure 1). Recovery was uncomplicated and since then the patient has not complained of wheezing.

In this case the main tuberculous disease was bronchial in character and wheezing was prominent. Although the patient had a background of allergic disease (hay fever), the early use of the bronchoscope in 1932 gave the diagnosis. Pneumonectomy is the curative treatment in such cases and in this one the wheezing did not recur.

Pulmonary calcifications as lung stones or as extrabronchial masses producing external bronchial pressure occur in coccidioides, histoplasmosis, and chronic non-tuberculous pulmonary suppuration, as well as pulmonary tuberculosis. Calcium salts are deposited in the lymph masses draining the diseased areas (Figure 2). After the salts form hard, irregular, often sharp concretions, they may erode or press upon the bronchi. Thus bronchial stenosis with wheezing results.

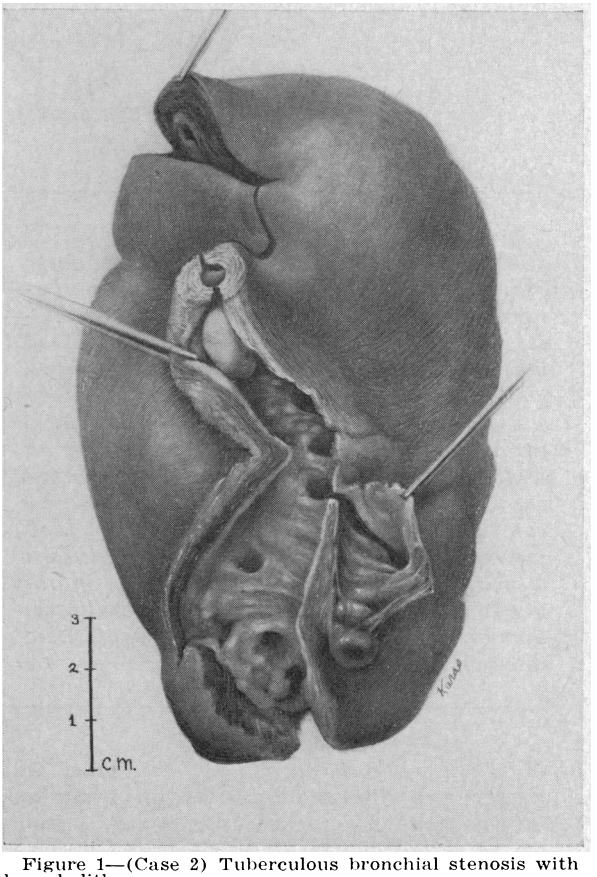

Figure 1—(Case 2) Tuberculous bronchial stenosis with broncholith.

CASE REPORT

CASE 3: An obese white female, aged 50, was admitted to the Cedars of Lebanon Hospital, September 20, 1947, with a diagnosis of a mass in the upper lobe of the right lung. There was a history of wheezing and chronic cough of several years' duration, the cause of which had been variously diagnosed as asthma, cardiac disease and tuberculosis. After a small hemoptysis, a bronchoscopic examination revealed a distortion of the right upper lobe area. A right upper lobectomy was performed and a large paratracheal calcified mass also was removed. The removed lobe showed large, calcified masses obstructing one of the segmental bronchi to the right upper lobe. There was no evidence of tuberculosis. Wheezing did not recur in 20 months of follow-up.

Bronchiectasis is often associated with wheezing and in some cases there is a large bronchospasm factor. Granulation tissue, thick secretions, and bronchial stenosis contribute to the wheeze. Psychosomatic factors are not uncommon. Bronchodilating drugs may contribute to the relief of symptoms. Perhaps no other group of patients is more apt to be treated for bronchial asthma with underlying bronchiectasis undetected. Upper lobe bronchiectasis is especially likely to be of the sicca variety without much production of sputum. Wheezing is often brought on by exertion and sudden postural changes. Occasionally lower lobe bronchiectasis before irreversible suppuration occurs may be associated with such wheezing. After suppuration, unless stenosis is present, patients are relieved of wheezing by pos-

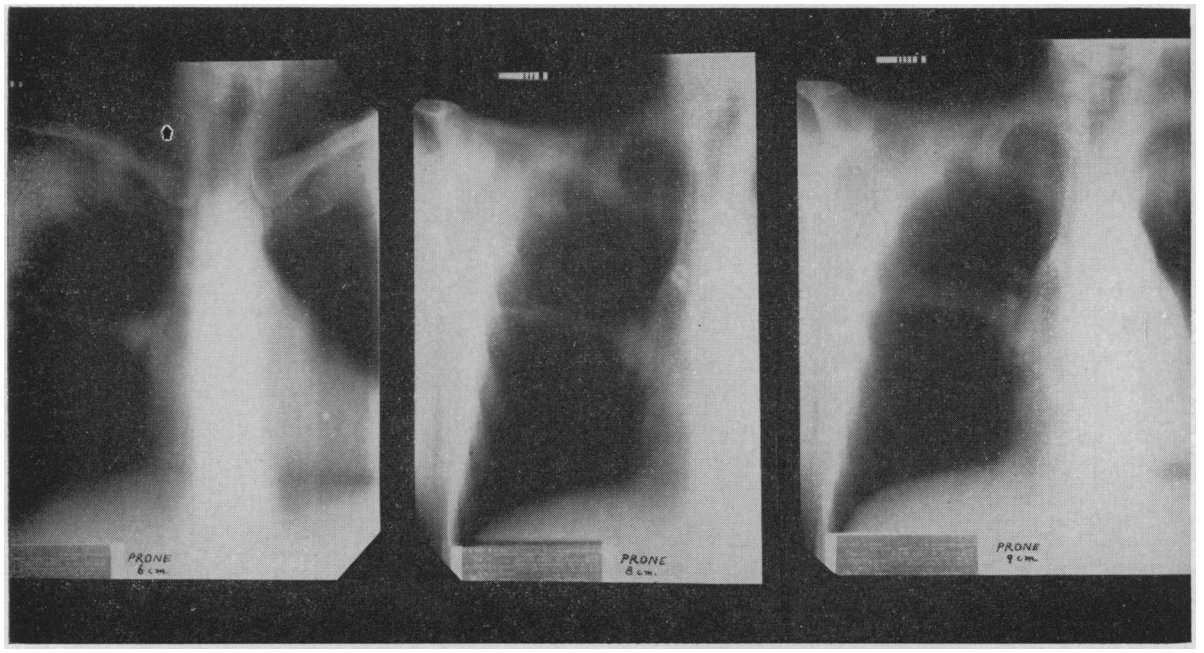

Figure 2.—(Case 3) Planigrams showing calcified masses in lower segmental (basal) bronchus, right upper lobe, and paratracheal area.

tural drainage. However, those who survive many years of extensive bilateral bronchiectasis develop associated emphysema and cor pulmonale which will restore wheezing.

CASE REPORT

CASE 4: A white male, aged 25, entered Cedars of Lebanon Hospital, August 30, 1946, with a diagnosis of bronchiectasis of the left lower lobe and lingula of the left upper lobe. In childhood the patient had been considered asthmatic because of wheezing and a choked-up feeling on exercise. This persisted until four years before admission, when he had pneumonia several times, followed by production of eight ounces of foul sputum daily.

On physical examination, wheezing rales were heard over the left lower chest. Bronchoscopy disclosed polypoid hypertrophy of the left lower lobe and bronchograms revealed cylindrical and cystic bronchiectasis in the left lower and lingula of the left upper lobe. Left lower lobectomy, with resection of the left lower lobe mucosa and lingula of the left upper lobe, was performed September 30, 1946.

Convalescence was uncomplicated and the patient left the hospital on the eighth postoperative day. Free of wheezing, cough and sputum, he returned to work as a barrel maker one month after operation.

This case is illustrative of severe bronchiectasis with psychosomatic symptoms. To assure complete recovery in such cases, all of the diseased area must be removed, as it was in this case. Symptoms with wheezing are especially apt to persist when the diseased lingula is not removed.

Cysts of the lung are especially likely to cause wheezing and shortness of breath. Thin-walled balloon cysts may fill an entire pleural cavity. From experimental work with tuberculous cavities, it is deduced that the wheezing is most apt to occur when the balloon cyst is being inflated and the pressure is highly negative in the cyst. Kinking of bronchi due to sudden changes in size within the lung as the balloon inflates is also probably a cause of wheezing. Until an x-ray film discloses a collapsed lung or outlines of a cyst, these conditions may masquerade as asthma.

CASE REPORT

CASE 5: A 61-year-old woman entered Cedars of Lebanon Hospital, September 25, 1948, complaining of dyspnea, wheezing, and intermittent pain for many years. As a young woman, she had been treated by allergists and cardiologists. The diagnosis of idiopathic recurrent spontaneous pneumothorax was made. Although there was not full response to the usual measures, serious symptoms were lessened. Due to dyspnea, the patient reached a state of acute anxiety and remained in bed for weeks at a time. She entered the hospital for exploratory thoracotomy.

The patient appeared to be well nourished and in no acute distress. At times an audible wheeze was heard without the aid of a stethoscope. Otherwise breath sounds were distant and diminished on the right and the percussion note was tympanitic.

At operation a large balloon cyst was removed. It filled the entire right pleural cavity and herniated into the left chest. After removal of the cyst the lung expanded completely, since only a small portion of the lung had to be removed with the cyst.

Cancer of the lung may produce polypoid excrescences into bronchi, and if the tumor is peripheral the first and only sign may be a wheeze. This sign of early cancer is extremely important as a diagnostic aid. The wheeze is often elicited only in certain postures. Asthma is frequently an early diagnosis in such cases. Careful x-ray studies, with lateral, oblique and planigram views, together with bronchoscopy, sputum examination for neoplastic cells, and exploratory thoracotomy are often necessary to prove the diagnosis. Occasionally asthma is present also, and when it is the cancer may be overlooked.

CASE REPORT

CASE 6: A white, nervous, anxious female, aged 54, entered Cedars of Lebanon Hospital, June 23, 1948, with a diagnosis of tumor of the upper lobe of the left lung. A mass had been present, slowly increasing, for approximately one year. The patient was hypertensive, and gave a history of asthma for many years. The tumor mass was discovered on fluoroscopic examination during a gastrointestinal study. Physical examination disclosed wheezing rales bilaterally over the bases. Bronchoscopy, June 23, 1948, did not reveal any encroaching mass and both biopsy and examination for tumor cells were negative. Exploratory thoracotomy and left pneumonectomy were performed July 27, 1948. The surgical specimen disclosed an epidermoid carcinoma; mediastinal lymph nodes contained no neoplasm. Postoperative convalescence was complicated by dyspnea and wheezing, worse with anxiety, and the patient came under the care of allergists for this asthmatic condition. She was ambulatory and did some housework, and after 11 months no sign of metastatic disease existed.

Conditions caused by benign polypoid bronchial tumors such as bronchial adenoma, fibroma, and ecchondroma are often first diagnosed as asthma because of the incomplete bronchial narrowing in lobar and stem bronchi. Hemoptysis with distal suppuration usually supervenes when obstruction becomes complete and constant. Wheezing is a usual early sign, and delay in diagnosis is due to considering wheezing to be asthmatic. Bronchoscopy almost always makes the diagnosis because of the location of the lesion within a bronchoscopically visible bronchus.

CASE REPORT

CASE 7: A white female, aged 17 years, who complained of asthma of six months' duration and who had had pneumonia a month previously, was admitted to the Harbor Branch of the Los Angeles County General Hospital, April 1, 1949. Six months previously, wheezing had been so pronounced that she had been placed under the care of an allergist. An x-ray film of the chest at that time showed no essential abnormality. After four months, a large hemoptysis occurred and the patient was referred to a tuberculosis hospital where bronchoscopic examination revealed a complete obstruction of the left stem bronchus by a polypoid tumor. Biopsy showed this to be an adenoma and exploratory thoracotomy was performed April 4, 1949. A tumor mass which was attached by a stalk three-eighths inch thick was removed through a transpleural bronchotomy incision (Figure 3). This adenoma was removed in toto and the bronchial incision repaired without stenosis being produced. The left lung aerated well after operation and the patient was discharged on the tenth postoperative day.

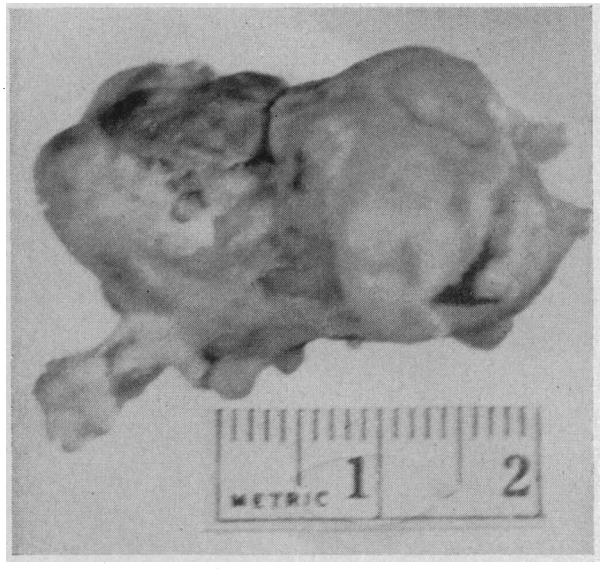

Figure 3.—(Case 7) Bronchial adenoma.

Mediastinal tumors, because of their proximity to trachea and large bronchi, frequently produce wheezing. Dermoids, lymphomata, Hodgkin's disease and thymic tumors may masquerade as asthma. Aneurysmal dilatation of the aorta and pulmonary artery, as well as auricular enlargement in mitral stenosis, are other lesions which produce pressure that causes wheezing. Because thymic tumors are apt to be associated with myasthenia gravis, wheezing may have a double origin due to prostigmine effects of increasing bronchial secretions and inability of the patient to cough vigorously to remove the mucus.

Foreign bodies in the bronchus, of course, are notorious sources of wheezing, especially in children. History of aspiration is not always obtained and organic foreign bodies, such as peanuts, are not radiopaque. Wheezing and dyspnea are the early chief symptoms of a disease easily confused with asthma. As time goes on, suppuration, hemoptysis, fever, or pneumonia usually supervenes so that some other diagnosis is suspected. X-ray studies and bronchoscopy are the main diagnostic measures, but even then the diagnosis may not be made until the lobe has been surgically removed because of suppurative disease.